Docket No.: **6284/0J678**

WHAT IS CLAIMED:

1. A cytokine-binding domain or portion thereof which binds to at least one cytokine and is capable of transducing a cytokine signal through a single cytokine receptor, said domain comprising a portion of the B'-C' loop of Domain 4 of $ß_c$ chain or analogous structure of a cytokine receptor.

2. A cytokine binding domain according to claim 1 comprising a portion of the B'-C' loop of domain 4 and a groove which is defined by the B'-C', F'-G' loops and the N-terminal section of Domain 4.

3. A cytokine binding domain according to claim 1 further including a Tyrosine residue capable of interaction with an α chain subunit or with Domain 3 of the $ß_c$ chain subunit to allow high affinity binding of the cytokine.

4. A cytokine binding domain according to claim 3 wherein the tyrosine is $Tyr42^1$ or equivalent residue of an analogous common signalling structure.

5. A cytokine binding domain according to claim 1 wherein the B'-C' loop of Domain 4 comprises residues 365 to 368 forming a type 1 ß-turn or an analogous structure in an analogous common signalling structure.

6. A cytokine binding domain according to claim 1 wherein the binding domain of $ß_c$ or portion thereof which binds to at least one cytokine is defined by an area bordered by any one of the following residues including Lys362, Tyr365, His367, Ile368, Arg418, Gly420, Asn422, Thr416, Ile338, Gln339, Met340 and Met361 or equivalent residues in an analogous common signalling structure of a cytokine receptor.

7. A cytokine binding domain according to claim 1 wherein the B'-C' loop of the Domain 4 includes Tyr365, Ile368 and His367.

8. A cytokine binding domain according to claim 1 that binds to at least two cytokines selected from the group including IL-3, IL-5 and GM-CSF, or IL-4 and IL-13.

9. A cytokine binding domain according to claim 1 wherein the common $ß_c$ chain or analogous structure of a cytokine receptor is derived from any one of the following, including GM-CSF, IL-3 and IL-5 receptors, the common IL-2 receptor γ chain (shared by the IL-2, IL-4, IL-7, IL-9 and IL-15 receptors) and gp130 (shared by the IL-6, IL-11, LIF, ciliary neutrophic factor, oncostatin M and cardiotrophin receptors) or from any of the cytokine superfamily receptors but not limited to the group comprising LIFR, gp130, IL-2Rß, IL-4R/IL-13R, IL-2Rγ, IL-3Rα, EPOR, TPOR and OBR or is selected from a related (class 1) cytokine receptor structure selected from the group including but not limited to growth hormone receptor (GHR), prolactin receptor (PRLR), erythropoietin receptor (EPOR), G-CSF receptor (G-CSFR) and gp130.

10. A cytokine binding domain according to claim 9 wherein the common $ß_c$ chain is derived from the IL-5, IL-3 or GM-CSF receptor.

11. A cytokine binding domain according to claim 2 wherein the F'-G' loop adopts a type IVß turn at its tip in Domain 4 and includes the residues Arg418 and Tyr421.

12. A method of identifying a compound having cytokine agonist or antagonist activity which comprises:

subjecting a potential cytokine agonist and/or cytokine antagonist compound to a cytokine binding domain or portion thereof according to claim 1; and

determining the presence of an agonist or antagonist response to the compound on the activity of a cytokine.

13. A method of identifying a compound having a cytokine antagonist

activity, which comprises:

subjecting a potential cytokine antagonist to a cytokine binding domain or portion thereof according to claim 1; and

identifying a compound that has bound to the cytokine-binding domain wherein said compound has an antagonist response on the activity of the cytokine.

14. A method according to claim 12 or 13 wherein the cytokine is selected from the group including IL-3, IL-5 and GM-CSF; or IL-4 and IL-13 and the presence of an agonist or antagonist is determined by the ability of the agonist or antagonist to activate or inhibit an IL-3, IL-5 or GM-CSF, IL-4, IL-13 response.

15. A method according to claim 12 or 13 wherein the cytokine agonist or antagonist further binds to Tyr421 or an equivalent residue of a common signalling unit of a cytokine receptor.

16. A cytokine agonist or antagonist identified by a method according to claim 12 or 13.

17. An antibody or fragment thereof to a cytokine binding domain according to claim 1.

18. A cytokine binding domain according to claim 1 comprising a mutation directed to any one of the residues selected from the group including Gln340, Ile338 and Met361 or an equivalent residue of a common signalling unit of a cytokine receptor.

19. A method of preventing or treating a cytokine-related condition, which method comprises administering to a subject an effective amount of an agonist or antagonist according to claim 16.

20. A method of preventing or treating a cytokine-related condition, which

method comprises administering to a subject an effective amount of an antibody according to claim 17.

21. A method according to claim 19 wherein the cytokine-related condition is selected from the group including survival or activation of eosinophil function, asthma, leukemia, breast cancer, prostate cancer, small cell lung carcinoma, colon cancer, chronic inflammation including rheumatoid arthritis, immunosuppression, allergy, lymphoma, and cachexia., wherein said cytokine agonist or antagonist is an antagonist.

22. A method according to claim 20 wherein the cytokine-related condition is selected from the group including survival or activation of eosinophil function, asthma, leukemia, breast cancer, prostate cancer, small cell lung carcinoma, colon cancer, chronic inflammation including rheumatoid arthritis, immunosuppression, allergy, lymphoma, and cachexia.

23. A method according to claim 19 wherein the cytokine-related condition is allergic inflammation and the antagonist inhibits the binding of any one of IL-5, IL-3 or GM-CSF to the IL-5, IL-3 or GM-CSF receptor.

24. A method according to claim 20 wherein the cytokine-related condition is allergic inflammation and the antagonist inhibits the binding of any one of IL-5, IL-3 or GM-CSF to the IL-5, IL-3 or GM-CSF receptor.

25. A method according to claim 23 wherein the allergic inflammation results in asthma.

26. A method according to claim 24 wherein the allergic inflammation results in asthma.

27. A method according to claim 19 wherein the cytokine-related condition is selected from the group including hemopoesis, boosting immune response, suppression of

embryonic stem cell differentiation, immunostimulation, antitumor activity, expansion of early hemopoietic cells, anemia, correcting thrombocytopenia, wherein said cytokine agonist or antagonist is an agonist.